Examination: 5072 Management II (Decision Theory) Final Winter Semester 2009/10

Examiner: Dr. Rainer Kleber

Allowed Aids:
You are allowed to use a pocket calculator, subject to the examination office policy concerning them. You are also allowed to use an English (or English to X / X to English where X is any other language) dictionary (book, not electronic) without any handwritten entries.

Instructions:
Ensure your name and matriculation number is correctly entered on the examination booklet and use the booklet to record your answers **legibly** (readably). You are requested to answer all of the questions. The examination has 60 points, and points for each of the questions are provided in brackets after each question. With respect to rounding, decimal places should be kept until the final answer, and then rounded to an appropriate number of decimal places. **Show all calculations.**

Good Luck!

Questions:

(1) Past data reveal that Big John's Bicycle Shop sold, on average, 6 bikes per day, with the sales rate relatively stable. Moreover, the sales rate seems relatively stable throughout the day and purchases appear to be independent of one another. The dealership is open for 8 hours a day.
   a. Which theoretical probability distribution does apply for sales per day? Explain why! **(4)**
   b. Find the probability that the time until the first sale is less than 2 hours. **(4)**
   c. Find the probability that no bike is sold during a day. (Hint: You will not need a table to answer this question.) **(2)**

(2) Name all 7 axioms which, if hold in a particular situation, yield decisions consistent with maximizing the expected utility. Shortly explain 3 of the mentioned axioms. **(10)**

(3) Walter's dog show is scheduled to appear in Magdeburg on May 16. The profits obtained are heavily dependent on the weather. In particular, if the weather is rainy, the show loses $15,000, and if sunny the show makes a profit of $10,000. (It will be either rainy or sunny.) Since ticket sales start at the beginning of March, Walter can still decide to cancel the show, but if he does he loses a $1,000 deposit he paid when accepting the date. Historical data reveal that there is a 25% probability that it will rain on May 16.
   a. Which decision should Walter make to maximize his expected net dollar return? **(2)**
   b. What is the expected value of perfect information (EVPI) in this situation? Drawing a decision tree is not required. **(4)**
   c. Walter has the option to purchase a forecast from Stella's Weather Wonder. Stella's accuracy varies. On those occasions when it has rained, she has been correct 90% of the time. On the other hand, when it has been sunny she was right only 80% of the time. Draw the corresponding decision tree and calculate the expected value of imperfect information (EVII). **(12)**
   d. How much should Walter be willing to pay for Stella's Forecast? **(2)**

(4) Suppose you are indifferent between a sure payment of 60 and a lottery with a probability of 0.3 of winning 100 and a probability of 0.7 of winning nothing.

a. Which kind of risk preference do you show? Explain! **(3)**
b. Sketch three different utility functions for wealth showing different risk attitudes. **(3)**

(5) A photographer is preparing for a fashion photo shoot at the green sand beach near South Point, Hawaii. The schedule for the photo shoot has been set far in advance and the supermodels involved can only be there on that one day. The National Weather Service has forecasted a 40% chance of rain. Rain would prevent the event from occurring and the photographer would lose $250. If the weather is perfect, then the photographer will net $1,000. Before the shoot, he owns a wealth of about $500 and he decides based on his logarithmic utility function of $\mathbf{U(x) = \ln(x)}$.

a. What would be the maximum price the photographer should pay for the insurance? **(6)**
b. Two years later, the photographer owns a wealth of around $5,000. Will he pay more or less for the insurance? How do we call such behaviour? **(4)**

(6) A decision maker is assessing weights for three attributes (A, B, and C) using the swing-weight method. When he images swinging the attributes from worst to best, he concludes that his improvement in satisfaction from Attribute A is 40% of the improvement from swinging Attribute B. Attribute C provides 10% of the improvement from swinging Attribute B. Calculate k_A, k_B, and k_C. **(4)**